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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/743,527 | 12/22/2003 | Liangfeng Xu | 042933/270304 | 7338 |
| 826 | 7590 | 12/16/2005 | EXAMINER | |
| ALSTON & BIRD LLP BANK OF AMERICA PLAZA 101 SOUTH TRYON STREET, SUITE 4000 CHARLOTTE, NC 28280-4000 | | | NGUYEN, HOA CAO | |
| | | ART UNIT | PAPER NUMBER | |
| | | | 2841 | |

DATE MAILED: 12/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|------------------------------|---------------------------|------------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/743,527 | XU ET AL. |
| | Examiner Hoa C. Nguyen | Art Unit 2841 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 22 December 2003.
 2a) This action is FINAL. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-18 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 1-18 is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 22 December 2003 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) Notice of References Cited (PTO-892)
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date 05/26/05.

4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____.
 5) Notice of Informal Patent Application (PTO-152)
 6) Other: _____.

DETAILED ACTION***Drawings***

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. The features such as the conductive layers are in electrical communication through the **at least one via**, as specified in claims 9 and 18. Therefore, the drawing(s) for the above features must be shown or the features canceled from the claims. It is also noted that cross hatched sectional views must also be provided, since a multi-layer is specified in the claims. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claims 2-9 and 11-18 are objected to because of the following informalities:

- (a) The "A multi-layer ..." must be changed to "The multi-layer ...".
- (b) The "A mobile ..." must be changed to "The mobile ...".

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cheng (US 6417460) further in view of Saida et al. (US 5718039) and in common knowledge.

Regarding claims 1-4, as shown in figure 3 and column 3, lines 42-63, Cheng discloses a multi-layer printed wire board structure, comprising:

- (1a) a first conductive layer S1 (signal wiring layer);
- (1b) a first insulative-coated conductive layer B1 (insulating substrate) upon which the first conductive layer S1 is disposed;
- (1c) a second conductive layer GND1 (ground wiring layer) upon which the first insulative-coated conductive layer B1 is disposed;
- (1d) a first insulative layer B2 (insulating substrate) upon which the second conductive layer GND1 is disposed;
- (1e) a third conductive layer S2 (signal wiring layer) upon which the first insulative layer B2 is disposed;
- (1f) a second insulative layer B3 (insulating substrate) upon which the third conductive layer S2 is disposed;
- (2a) a fourth conductive layer S3 (signal wiring layer) upon which the second insulative B3 is disposed;
- (2b) a third insulative layer B4 (insulating substrate) upon which the fourth conductive layer S3 is disposed;
- (3a) a fifth conductive layer POWER (power wiring layer) upon which the third insulative layer B4 is disposed;
- (3b) a fourth insulative layer B5 (insulating substrate) upon which the fifth conductive layer POWER is disposed;
- (3c) a sixth conductive layer S4 (signal wiring layer) upon which the fourth insulative layer B5 is disposed;

(3d) a fifth insulative layer B6 (insulating substrate) upon which the sixth conductive layer S4 is disposed;

(3e) a seventh conductive layer GND2 (ground wiring layer) upon which the fifth insulative layer B6 is disposed;

(3f) a second insulative-coated conductive layer B7 (insulating substrate) upon which the seventh conductive layer GND2 is disposed; and

(3g) an eighth conductive layer S5 (signal wiring layer) upon which the second insulative-coated conductive layer B7 is disposed.

However, Cheng failed to disclose the range of thickness and the nominal thickness for each layer as specified by the applicants.

Saida et al., as shown in figure 1, disclose a multi-layer printed wire board structure, comprising outer-layer members and inner-layer member; wherein each member having conductive layer(s) and an insulating layer. Saida et al. also disclose that the conductive layer is a copper foil having a thickness of preferably 9-100 μm and more preferably 12-35 μm and the insulating layer is at least 50 μm , see column 1, lines 25-34 and lines 42-52.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the teachings from Saida et al. on the multi-layer printed wire board of Cheng in order to reduce the size of the circuit board for an electronic housing structure having a limited real estate.

Furthermore, the general conditions of a claim are disclosed in the prior art, discovering an optimum or workable ranges involves only routine skill in the art.

In re Aller, 105 USPQ 233.

Regarding claim 5, Cheng discloses the first and second conductive layers are formed of copper, see column 3, lines 63-65.

Regarding claim 6, Cheng discloses the first insulative-coated conductive layer comprises a resin-coated copper layer (polyester prepreg – an epoxy resin base dielectric compound for coating/forming wiring patterns), see column 4, line 2.

Regarding claim 7, Cheng discloses each insulative layer comprises a dielectric layer. It is noticed that an insulating layer is inherently a dielectric layer.

Regarding claim 8, Cheng discloses each insulative layer is formed of glass fibers and an epoxy matrix, see column 4, line 5. It is noticed that the epoxy resin with glass fiber is an epoxy matrix composite or fiberglass-reinforced composite.

Regarding claim 9, Cheng discloses every limitation as shown in claim 1 above, but failed to disclose the first insulative-coated conductive layer defines at least one via between the first and second conductive layers such that the first and second conductive layers are in electrical communication through the at least one via.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the first insulative-coated conductive layer defines at least one via between the first and second conductive layers such that the first and second conductive layers are in electrical communication through the at least one via, since conductive vias are well known in the art for electrically connecting between layers.

Regarding claims 10-18, Cheng discloses every limitation as shown in claims 1-9 above but failed to disclose a transmitter and receiver for transmitting and receiving signals, respectively, via a wireless communications system.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to apply the teachings of Cheng in view of Saida et al. on a wireless communications system, since a circuit board is the basic structure of a wireless communications system and as a wireless communications system, a transmitter and receiver are inherently included. It is also noticed that the recitation that a mobile terminal has not been given patentable weight because it has been held that a preamble is denied the effect of a limitation where the claim is drawn to a structure and the portion of the claim following the preamble is a self-contained description of a structure not depending for completeness upon the introductory clause. *Kropa v. Robie*, 88 USPQ 478 (CCPA 1951).

Citation of Related Art

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Ando et al. (US 6747356) disclose a semiconductor device.

Cheng (US 6489570) discloses a multi-layer circuit board.

Fushie et al. (US 20020100608) disclose a multi-layer printed wiring board and a process of producing same.

Cheng (US 6384340) discloses a multi-layer circuit board.

Robbins et al. (US 6365839) disclose a multi-layer printed circuit board with dual impedance section.

Miller et al. (US 20020007966) disclose a structure for high speed printed wiring boards with multiple differential impedance-controlled layer.

Chen et al. (US 6165596) disclose a multi-layer insulated metal substrate printed wiring board having improved thermal coupling of components.

Prabhu et al. (US 5866240) disclose a thick ceramic on metal multi-layer circuit board.

Kanakarajan et al. (US 20050100719) disclose a multi-layer substrates having at least two dissimilar polyimide layers, useful for electronics-type applications, and compositions relating thereto.

Japp et al. (US 6343001) disclose a multi-layer capacitance structure and circuit board containing the same.

Kikuchi et al. (US 6573600) disclose a multi-layer wiring substrate having differential signal wires and a general signal wire in different planes.

Fukui et al. (US 6572793) disclose a method of producing ceramic composition and method of producing electronic device.

Conclusion

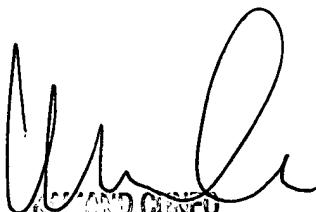
7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoa C. Nguyen whose telephone number is 571-272-8293. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kammie Cuneo can be reached on 571-272-1957. The

fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hoa C. Nguyen
9 December 2005



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